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Studies of Electromagnetic Ion Cyclotron Waves Using AMPTE/CCE and Dynamics Explorer

Semi-Annual Report Covering the Period
from
6/1/93 to 12/1/93

Grant: NASA NAG 5-160-1

Principal Investigator: R. E. Erlandson

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Summary of Work Performed From 6/1/93 to 12/1/93

The principal activity during the past six months has involved the analysis of ion cyclotron waves recorded from DE-2 using the magnetic field experiment and electric field experiment. The results of this study have been published in the Geophysical Research Letters (GRL); the paper is included as part of this report. The primary finding of this paper is that ion cyclotron waves were found to heat electrons, as observed in the DE-2 Langmuir probe data, through a Landau damping process.

A second activity, which was started during the last six months, involves the study of large amplitude ≈ 1 Hz electric and magnetic field oscillations recorded in the nightside auroral zone at substorm onset. Work is under way in collaboration with Dr. Tom Aggson (GSFC) to determine the properties of these waves and investigate any association these waves may have with the substorm initiation process.

A third activity under way involves a comprehensive study of ion cyclotron waves recorded at ionospheric altitudes by DE-2. This study will be an extension of the work reported in the GRL paper and will involve a larger sampling of wave events. This paper will focus on wave properties at ionospheric altitudes.

A fourth activity involves a more in-depth analysis of the acceleration mechanisms and the resulting electron distributions based on the observations presented in the GRL paper. This work will be done in collaboration with Dr. Khazanov at the University of Michigan. Dr. Khazanov will work at no cost to this grant.

A list of publications and presentations are listed below:

Publications:

Erlandson, R. E., T. L. Aggson, W. R. Hoegy, and J. A. Slavin, Simultaneous observations of subauroral electron temperature enhancements and electromagnetic ion cyclotron waves, Geophys. Res. Lett., 20, 1723, 1993.

Presentations:

Erlandson, R. E., T. L. Aggson, W. R. Hoegy, and J. A. Slavin, Simultaneous DE-2 observations of subauroral electron enhancements and ion cyclotron waves, International Association of Aeronomy and Geophysics, 1993.

Erlandson, R. E., T. L. Aggson, and J. A. Slavin, DE-2 observations of electron acceleration and heating by EMIC waves at subauroral latitudes, Fall American Geophysical Meeting, 1993.

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